The Impact of Implementing the Carousel Brainstorming Strategy to Improve Students' Critical Reading Comprehension in Revolution 5.0

Yusrizal
Universitas Terbuka
yusrizal@ecampus.ut.ac.id,
Ferri Susanto
State Islamic University (UIN) Fatmawati Sukarno Bengkulu
ferrisusanto@mail.uinfasbengkulu.ac.id
Ildi Kurniawan
Universitas Bengkulu
ildikurniawan@unib.ac.id
Corresponding email: yusrizal@ecampus.ut.ac.id

Abstract

This study investigated the effect of the Carousel Brainstorming strategy on students' critical reading comprehension. A mixed-methods approach was used, combining a quantitative quasi-experimental non-equivalent control group design with qualitative action research. The sample consisted of 30 students selected through purposive sampling, divided into an experimental and a control group.The quantitative findings indicated that the use of the Carousel Brainstorming strategy significantly improved students' critical reading comprehension, with a two-tailed significance of p=0.015. The effect size, as measured by Partial Eta Squared, was 0.610, representing a moderate effect (61%). The qualitative results further supported this finding, showing a progressive increase in students' average critical reading comprehension scores from an initial 43.3% to 53.3% after the first cycle and 73.3% after the second cycle.This research demonstrates that the Carousel Brainstorming strategy is an effective and viable method for enhancing students' critical reading skills. The findings have implications for educators, suggesting that this strategy can be incorporated into teaching practices to improve students' critical thinking and reading abilities.

Keywords: Carousel brainstorming, critical reading, revolution 5.0

Introduction

Various forms of digital reading applications contribute to innovative changes for everyone to use. Digital systems refer to the use of digital technology to enhance economic growth, competitiveness, and living standards at national, regional, industry, and corporate levels (Baranova ,M,n.d). Digital reading is evolving without limitations, requiring everyone to adapt well, making internet usage a necessity for seeking hypertext and multimedia reading sources. This has led to a drastic deviation in reading comprehension levels that sometimes exceed physical limitations.

Essentially, reading applications serve as tools that provide convenience in searching for various types of reading sources, but they are not necessarily effective in understanding the readings. Digital resources and instructional support are not significant predictors of students' digital reading comprehension. Consequently, there will be a decline in students' reading comprehension, especially in the digital age, despite the abundance and accessibility of digital reading materials. Students face several specific challenges: Difficulty with vocabulary and sentence structure: Students struggle to understand contemporary vocabulary and complex sentences. Weak overall comprehension: They find it challenging to grasp main ideas, storylines, and overall text content. Inability to identify text types and structures: Students struggle to recognize various text types and English structures. Lack of critical reading skills: Students' insights and ability to compete in the digital world are weak due to the lack of developed critical reading skills, which are essential for analyzing, synthesizing, and evaluating information in the era of Industry 5.0. These findings contribute to our understanding of the factors influencing children's digital literacy development (Cho, B. Y., Hwang, H., and Jang B. G., 2021).

Digitalization functionally plays its role as a technological development in the current industrial revolution era. If we consider digital e-books exclusively, there are around 980 million readers worldwide. This surge is attributed to the popularity of digital eBooks among readers and the ease of creating digital e-books among publishers. The abundance and diversity of reading also lead to confusion in understanding texts in detail. In general, students encounter several weaknesses in digital reading comprehension; therefore, forms of digital reading will provide excellent motivation for students' understanding of texts, including difficulties in understanding contemporary vocabulary and complex sentences, comprehending paragraphs and overall text content, identifying main ideas and storylines, recognizing various text types, and understanding English structures. The occurring phenomenon provides factual illustrations that changing habits in this technological revolution era requires the ability to adapt quickly, as digital technology seems to force changes in reading routines. Digital technology is rapidly transforming daily routines, and today's youth spend most of their time using various digital devices. As a result, traditional print page reading is being transformed into reading digital texts among students. Thus, online reading strategies have become essential for their

development in online reading performance (Habók, A., tun zawoo, and magyar, A., 2024).

Digital development and the limitless revolution of Industry 5.0 significantly correlate with human needs that have become oriented toward digital technology, as well as the development of digital reading resources. Industry 5.0 has the capacity to surpass the efficiency oriented toward technology in Industry 4.0 and advance sustainable development goals, such as prioritizing human needs, ensuring environmental sustainability, and enhancing resilience (Yang, T., Razzaq, L., et al., 2024). The principles of the Industry 5.0 revolution greatly influence the level of students' reading comprehension habits regarding digital literacy, which continue to develop variably and automatically. Industry 5.0 involves human-robot collaboration, integrating human intelligence with robots to optimize performance. This builds on Industry 4.0, emphasizing safe collaboration and human-centered technology in shared workspaces (Yitmen, I and Almusaed, A, 2024). This forces students to comply with technology and requires them to understand by reading critically to enhance their skills in detailed reading comprehension of technology. Compliance in reading is often enhanced in terms of compliance with digital reading, which can certainly help develop students' literacy insights before engaging in college activities. Reading compliance before attending classes is crucial for understanding English lectures, with a secondary aim of identifying factors that influence reading compliance before lectures (Graham, M, K, 2024).Factually, there is certainly a gap between digital reading and conventional reading that can provide evidence of this gap, namely the lack of empirical evidence and effective strategies to specifically address the weaknesses of digital reading comprehension, especially in collaborative and engaging ways. While the provided text mentions that instructional support and digital resources are not significant predictors of digital reading comprehension, it also notes the importance of effective strategies to address issues such as boredom and monotony associated with digital reading. This text hints at the potential of cooperative and collaborative methods but does not provide concrete evidence or specific strategies to be applied. Therefore, the research conducted aims to fill this gap by investigating specific collaborative strategies—carousel brainstorming strategies—to determine their impact on improving students' critical reading comprehension. This study is designed to bridge the gap between recognized issues (weak digital reading comprehension) and

potential solutions (structured collaborative strategies) that have not yet been fully explored or proven in this specific context. To this end, reading and comprehensively understanding texts will be effectively implemented if students also understand which strategies are effective and efficient when reading various texts, both online and in digital systems. Hence, with the various phenomena that have occurred, especially regarding reading strategy understanding and critical reading comprehension, the researcher is interested in studying "the impact of implementing carousel brainstorming strategies on improving students' critical reading comprehension in the era of Revolution 5.0."

The Carousel Brainstorming Strategy

Reading comprehension requires effective strategies to achieve a good understanding of the text. A key element of the Carousel Brainstorming strategy includes the integration of different models, multiple rounds of reasoning elaboration, and reaching a consensus answer within the group (Qin, Z., Wang, C., et al., 2024). A deep understanding of the effectiveness of guided reading intervention strategies (GRR) and the gradual release of responsibility requires consideration of various levels of comprehension. The implications for reading instruction practice necessitate appropriate reading strategies (Lin Wu, Valcke, M., and Keer, V.H., 2023). Effective digital reading comprehension strategies are essential for every student to achieve a good level of reading understanding, thus fostering students' visual behaviors towards digital reading comprehension. Two significant visual behavior patterns have been identified for critical reading: (1) after a pause for thought or rest, the visual attention of critical readers shifts directly back to the reasoning information; and (2) the visual attention of critical readers shifts between reasoning information and data. (Tsai, M, J Wu, H, W and et al., 2022) These behavior patterns play a crucial role in developing students' critical reading skills, particularly in enhancing critical reasoning related to reading comprehension. Fundamentally, visual reading behavior has provided evidence for the application of eye-tracking technology in assessing critical reading strategies and the relationship between data information and critical reading strategies forms a system based on what students do regarding digital reading comprehension. Thus, reading strategies can significantly contribute to the development of critical reading designed with adaptive learning systems and the teaching of critical reading

strategies in the future. Digital reading can certainly create a monotonous atmosphere, leading to high levels of boredom and potential saturation.

However, with the right strategies, this can be addressed, especially by applying cooperative and collaborative methods among students to overcome stagnation caused by monotony. One reading strategy that offers a cooperative and collaborative atmosphere is the Carousel brainstorming strategy. Key elements of a successful Carousel Brainstorming strategy may include generating diverse ideas, selecting the most feasible solutions, and utilizing algorithmic reasoning to refine large language models in coding creation. (Li, X., Xue, J, T and et al., 2023). The application of this strategy certainly provides a projection for better reading comprehension, where more individualistic students will change their behavior to exchange ideas and assess their knowledge on various topics related to reading comprehension. The goals of the Carousel Brainstorming Strategy (CBS) include: enhancing Creativity and Innovation: CBS encourages participants to think outside the box and generate unconventional new ideas; improving Collaboration and Teamwork: CBS helps teams work together effectively and appreciate each other's ideas; increasing Efficiency and Productivity: CBS helps teams produce more ideas in a shorter amount of time; improving Decision Quality: CBS aids teams in making better decisions by considering various available options; and boosting Spirit and Motivation: CBS can help enhance team spirit and motivation by making the brainstorming process more enjoyable and engaging (Carousel, Robert, 2023).

By exchanging ideas in understanding reading, students can collaborate well, which will impact the development of logic, critical thinking, and insight in reading comprehension. Critical reading involves the use of reading strategies in a cross-curricular approach to develop students' abilities to analyze, synthesize, and evaluate written material, facilitating deeper understanding and critical thinking skills (Roa, R, C, 2024). The lack of development in critical reading skills among students can be said to be a contributing factor to the weak quality of students' insights to compete in the digital world in the current era of Industry 5.0 revolution.

Critical reading skills will continue to be used as essential skills so that students can adapt to global developments

Critical reading involves integrating, interpreting, evaluating, and actively reflecting on the ideas presented in texts or multiple texts, going beyond literal understanding to develop deeper understanding and critical thinking (Psyridou, M.,

Ruotsalainen, J., et al., 2024). Critical reading skills are a major contributor to a positive classroom atmosphere, further prompting educators to recognize the influential role of critical thinking in students' attitudes toward classes and their academic development (Moghadam, Z.B., Narafshan, M.H., & Tajadini, M., 2023).For this reason, the use of appropriate strategies for understanding reading is essential to build critical thinking in the readings consumed by students. The use of digital reading certainly provides many positive impacts for students, especially the conveniences felt: (1) It significantly predicts students' positive attitudes toward digital academic reading tools on computers; (2) perceived ease of use, positive responses from lecturers, and expectations of academic achievement are significantly positive predictors of students' perceived usefulness of these tools; (3) attitudes and expectations of academic achievement significantly predict students' positive intentions to use these tools; (4) academic experience significantly predicts students' negative attitudes toward these tools; (5) perceived ease for collaborative learning and self-efficacy significantly predicts the perceived ease students have in using these tools (Lin, Y., Yu, Z., 2023).

Research Methodology

This research employs a mixed methods approach, combining quantitative and qualitative methods (sequential explanation). Mixed methods research integrates quantitative and qualitative approaches to gain a comprehensive understanding of the research topic (Adryan, A, Z, 2023). Mixed methods involve merging quantitative and qualitative approaches for instrument validation, enhancing construct validity by assessing suitability, convergence, and credibility of data (Perrenoud, G., Geese et al., 2023). Mixed methods refer to the combination of various educational methodologies to systematically and relatively address contemporary educational challenges. Mixed Methods Research (MMR) involves the deliberate collection, analysis, and integration of quantitative and qualitative data to answer complex research questions (Jenkins, A, M, 2023). Therefore, mixed methods is a research design that systematically combines two or more research methodology traditions within one study (Johnson, R. B., & Onwuegbuzie, A. J., 2024). This study was conducted at Fatmawati Sukarno, Islamic University of Bengkulu. Thirty participants were selected using purposive sampling to ensure comprehensive representation of perspectives in both the experimental and control classes. This

research focuses on the English study program, specifically targeting seventh-semester students who have both experience in academic reading and familiarity with critical readings, as seventh-semester students are considered the ideal population for this study. At this stage of their academic journey, they have a strong foundation in academic and critical reading. For the quantitative data, the research design used is quasi-experimental, with calculations for validity and reliability, as well as tests for normality and homogeneity assumptions. Qualitatively, data were collected from reading tests and action research in the form of cycles. The study was conducted in two cycles, with student evaluations taking place at the end of each cycle. The research sample consisted of 30 students selected using purposive sampling techniques. A sample size of 30 students is a common and practical figure for this type of quasi-experimental study. It is large enough to provide statistically meaningful quantitative data but small enough to allow for in-depth qualitative analysis. This size facilitates more focused observations and detailed data collection, such as during the cycles of action research, while also making it manageable to implement carousel brainstorming strategies and evaluate their impact on each student. Purposive sampling involves selecting specific participants based on the research objectives. Techniques used include extreme case sampling, deviant case sampling, and maximum variation sampling to ensure targeted participant selection (Nyimbili, F and L, 2024).

Findings and Discussion

Findings

The results of this research were analyzed using both quantitative and quantitative methods (Mixed-method), with quantitative analysis conducted first, followed by qualitative data analysis (Sequential Explanatory):

A. Quantitative Research Results

This research quantitatively falls under the category of parametric statistics, thus the assumptions of normality, linearity, and homogeneity must be met. Data normality refers to data that follows a normal distribution pattern. The normality test is conducted on the monitoring data to assess the characteristics of its distribution (Cho, H, Y, 2021). The sample size in this study consists of 30 students, which is less than 50; therefore, the guideline for determining normality uses the Shapiro-Wilk test.

The Shapiro-Wilk test is a statistical test used to determine whether a set of data follows a normal distribution (Six Sigma, 2024). As shown in Table 1 below.

Table 1. Test of Normality

	Tests of Normality					
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Carousel Brainstorming Strategy	,138	30	,149	,943	30	,111
Students'critical Reading Comprehension	,156	30	,059	951	30	,176
a. Lilliefors Significance Correction						

Based on the principle of normality, a significance level greater than 0.05 indicates that the data is normal, while a significance level less than 0.05 indicates that the data is not normal. In the Shapiro-Wilk normality table above, it can be concluded that: the value of the Carousel Brainstorming Strategy is 0.11, which is greater than 0.05, meaning the data is normally distributed, and the value of the Technique of Students' Critical Reading Comprehension is 0.176, which is also greater than 0.05, indicating that the data is normally distributed. Following this, a linearity test was conducted to determine whether there is a linear relationship between the dependent variable and each independent variable being tested. Linearity is a key organizational concept in modern Western thought, considered in relation to non-linearity, especially in literary and scientific works as well as in poststructuralist thinking (Hutton, C, M, 2023). Statistically, linearity refers to the linear relationship between two variables. A linear relationship means that The translation of the text into English is: "The change of one variable in a constant manner is related to the change of another variable (Garson, G. David, et al, 2022). This is shown in Table 2 below:

Table 2. Linearity Test

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Carousel Brainstorming Strategy	Between Groups	(Combined)	1,524	9	,169	8,281	,000
		Linearity	1,314	1	1,314	64,249	,000
Students'critical Reading Comprehension		Deviation from Linearity	,210	8	,026	1,285	,306
	Within Groups		,409	20	,020		
	Total		1,933	29			

Based on the results of the ANOVA table, the function of linearity is to determine the form of the relationship between independent variables and dependent variables. The decision-making criteria are as follows: If the Sig. deviation from linearity value > 0.05, there is a linear relationship between the independent variable and the dependent variable. If the Sig. deviation from linearity value < 0.05, there is no linear relationship between the independent variable and the dependent variable. The ANOVA table, it can be concluded that 0.306 > 0.05, which means there is a linear relationship between the independent variable and the dependent variable. The next assumption test is homogeneity. Homogeneity in statistics refers to a situation where two or more groups of data have the same probability distribution. In other words, these groups have similar characteristics in terms of variability and the shape of their data distribution (Agresti, Alan, et al, 2023). Homogeneity refers to the similarity of characteristics within a population group. A population group is said to be homogeneous if it has the same characteristics in terms of demographics, culture, values, and beliefs (Bryman, Alan, 2023).

Table 3. Homogeneity Test

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Carousel Brainstorming Strategy	Based on Mean	1,218	2	87	,301
	Based on Median	1,189	2	87	,309

Technique of Students'critical Reading Comprehension	Based on Median and with adjusted df	1,189	2	86,283	,309
	Based on trimmed mean	1,216	2	87	,301

Based on the decision-making table for the Homogeneity Test, if the significance value > 0.05, then the data distribution is Homogeneous (the variances of the data are the same), and if the significance value < 0.05, then the data distribution is not homogeneous (the variances of the data are different). The data shows a Levene Statistic of 0.301 > 0.05, indicating that the data is homogeneous.

The statistical data obtained, it can certainly serve as a reference to focus on the Carousel Brainstorming Strategy, which can enhance critical reading comprehension, among other things: Encouraging Active Engagement, critical reading is an active process, not a passive one. Readers must go beyond merely understanding the words on the page; they must analyze, evaluate, and synthesize information. The Carousel Brainstorming Strategy (CBS) is inherently active. Students physically move between different "stations" or topics, actively contributing their ideas and building on their peers' ideas. This forces them to engage with the material directly, which is far more effective for developing critical thinking skills than simply listening to a lecture. Encouraging Diverse Perspective and Deeper Analysisi, with CBS activities, different student groups may be asked to focus on various aspects of the text, such as: Identifying the author's main arguments, analyzing the evidence used to support those arguments, evaluating the strengths and weaknesses of the arguments, and connecting the text to real-world examples or other works. Promoting Collaborative Learning, the collaborative nature of CBS is crucial. As students discuss and write down their ideas, they are essentially practicing and refining their critical analysis skills in a social context. They must articulate their thoughts clearly, listen to their peers, and constructively critique or build upon existing ideas. This peer interaction can clarify misunderstandings and encourage students to think more deeply, ultimately strengthening their ability to read and critically understand complex texts. The shared knowledge and collective problem-solving inherent in CBS directly support the skills needed for critical reading, which involves understanding, synthesizing, and evaluating information.

B.   Qualitative Research Results

The acquisition of qualitative data originates from action research in the form of cycles. Action research is a collaborative and critical investigation by practitioners into a significant problem in their practice. It is highly suitable for the development of education, professionalism, and organizations, emphasizing practical improvement and self-reflection (Talluri, S, 2023). Therefore, action research is a deliberate and solution-oriented investigative process where participants systematically analyze their practices to solve problems. This involves identifying issues, collecting data, reflecting, taking action, and redefining (Sharma, L., R, 2022). The research results indicate that students' ability to understand the author's intent behind the text, analyze the structure of the text, identify assumptions from the reading, and evaluate the credibility of the reading information has improved. McWhorter defines critical reading as an activity focused on understanding the author's intent behind the text, not just comprehending the written information. It involves a process of analyzing the structure of the text, identifying the author's assumptions and biases, and evaluating the credibility of the information presented (McWhorter, M, 2023).The critical reading comprehension abilities that are sought to be achieved include: enhancing critical and analytical thinking skills, improving the ability to understand and interpret information, increasing the ability to form logical and coherent opinions and arguments, enhancing decision-making abilities, and improving learning and problem-solving skills.
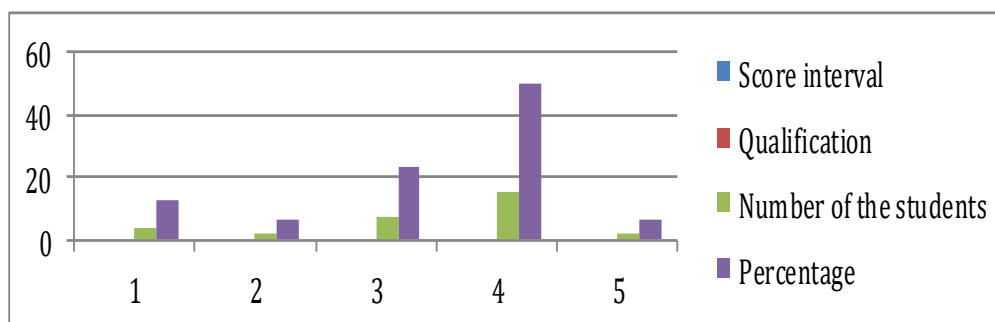
Pre-Assessment Test Results

The Pre-Assessment Test results serve as a measurement conducted before starting the learning process to determine the knowledge and skills possessed by students. The main purpose of the pre-assessment test, according to Brookhart, is to assist instructors in making appropriate instructional decisions (Brookhart, S. M., 2022). To understand the level of critical reading comprehension before taking action, the researcher conducted a pre-assessment test by providing instructional instruments.

Table 4. The Percentage of Pre-Assessment Test

Score Interval	Qualification	Number of the students	Percentage (%)
80-100	Very Good	4	13 %
70-79	Good	2	6,6. %

60-69	Moderate	7	23,3 %
50-59	Low	15	50.0 %
<49	Failure	2	6,6 %

From the table above, the ability of students to master critical reading comprehension shows that 4 students (13%) fall into the "Very Good" category; 4 students (6.6%) fall into the "Good" category; 7 students (23.3%) fall into the "Medium" category; 15 students (50.0%) fall into the "Low" category; and 2 students (6.6%) fall into the "Fail" category. Therefore, the score for those who are able to understand critical reading comprehension is only 43.3%, while the Low and Fail categories reach 56.6%.

Chart 1. The Result of Pre-Assessment Test

Cycle I

Based on the context of the Action Cycle Theory, a cycle refers to the interconnected modules of perception and mental imagery: Schemata, Objects, Actions, Affect, Goals, and Others' Behavior (Marks, D, F, 2023). The results of the pre-assessment test aim to enhance students' abilities in mastering critical Reading Comprehension by implementing the Carousel Brainstorming strategy in the teaching process, which is based on the lesson planning outlined in the syllabus and lesson plan that have been prepared. The instructor and collaborators have prepared the Carousel Brainstorming strategy, which includes preparation, revision, and re-testing until it is effective.

Planning is a step to prepare learning strategies in the classroom that will be developed in research to solve students' problems. Teaching materials based on the strategies used have been prepared. Instructors must prepare the Carousel

Brainstorming strategy, which includes preparation, revisions, and re-testing until it is effective in addressing students' issues.

Implementation of Cycle I was conducted over 3 meetings. These meetings were held based on the planned strategies. At this stage, the researcher mastered the planning and teaching activities before starting the implementation in the classroom. Throughout the process, the collaborator observed the implementation of the plan to see how the strategy could solve problems in the classroom.

Observations were conducted by the researcher and collaborator. All necessary data and information have been collected, along with the execution of Cycle I. At this stage, the strategy was implemented well. Students showed significant progress in their critical and analytical thinking skills in understanding reading texts. Classroom learning appeared enjoyable and comfortable for students when applying the Carousel Brainstorming Strategy.

Reflection: Based on the data collected during the four meetings of Cycle I, the researcher found that almost all students essentially possess basic critical reading comprehension skills, particularly in understanding and interpreting information from texts. They also demonstrated good motivation in learning English, especially in reading comprehension. However, students appeared unfamiliar with applying the Carousel Brainstorming Strategy. This may be because they were encountering the strategy for the first time in reading comprehension learning at that time. It is necessary to make them accustomed to the strategy. The results of Cycle I showed significant improvement in students' critical reading comprehension skills, as the data indicated that only 20% achieved very good results, with low achievers at 30%, and failures at 6.6%.

Table 5. The Percentage of Cycle I Test

Score Interval	Qualification	Number of the students	Percentage (%)
80-100	Very Good	6	20 %
70-79	Good	4	13.33%
60-69	Moderate	6	20 %
50-59	Low	12	30 %
<49	Failure	2	6,6%

From the table above, the students' ability to understand narrative texts in reading comprehension is as follows: 6 students (20%) fall into the "Very Good" category; 4 students (13.33%) fall into the "Good" category; 6 students (20%) fall into

the "Moderate" category; 12 students (30%) fall into the "Low" category; and 2 students (6.6%) fall into the "Fail" category. The calculations show that the abilities in critical and analytical thinking, understanding and interpreting information, forming logical and coherent opinions and arguments, making appropriate decisions, and learning and problem-solving only reached 53.3%. This means the research target has not been achieved. It is important to conduct Cycle II. For the next cycle, specific emphasis should be placed on certain strategic steps that are considered weaknesses for the students in the previous cycle.
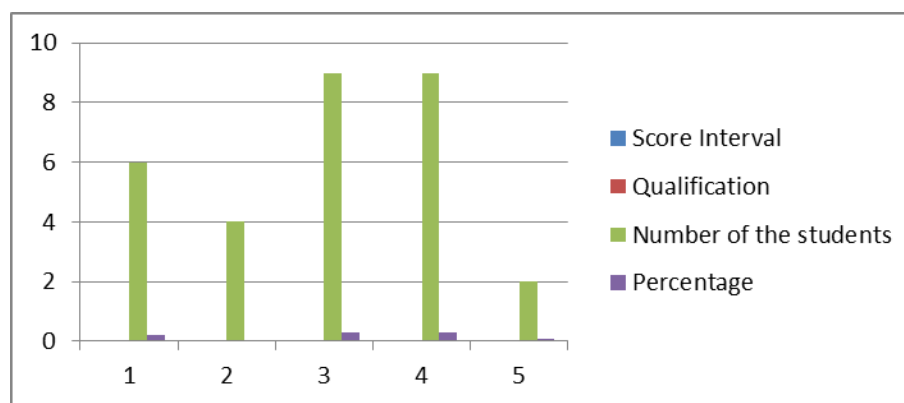
Chart 2. The Result of Cycle 1

Cycle 2

Observational observations were conducted by the researcher and collaborators. All necessary data and information were collected along with the implementation of Cycle II. At this stage, the strategy was well implemented. The students showed progress in their ability to understand narrative texts in reading comprehension. This means that the strategy is aimed at solving students' problems in improving Critical Reading Comprehension. In the teaching and learning process in the classroom, students appeared to enjoy and feel comfortable studying reading texts critically by applying the Carousel Brainstorming Strategy.

Reflection based on data collected during the four meetings of Cycle II, the research found that in this cycle, students successfully understood Critical Reading Comprehension. Most students had already grasped the processes and implementation of the Carousel Brainstorming Strategy. They appeared very enthusiastic about improving their Critical Reading Comprehension skills. Finally, from the distribution of student scores in Cycle II, it is evident that there was a significant improvement made by students in developing Critical Reading Comprehension,

particularly when comparing the average scores of students in Cycle II with the Pre-Assessment test.

Table 6. The Percentage of Cycle II Test

Score Interval	Qualification	Number of the students	Percentage (%)
80-100	Very Good	7	23,3 %
70-79	Good	14	46,6%
60-69	Moderate	1	3,3%
50-59	Low	7	23,3%
<49	Failure	1	3,3 %

Based on the data in Table 6 above, 7 students (23.3%) fall into the "Very Good" category; 14 students (46.6%) fall into the "Good" category; 1 student (3.3%) is in the "Moderate" category; 7 students fall into the "Low" category (23.3%), and 1 student failed (3.3%). Thus, students who were able to improve their Critical Reading comprehension in the second cycle reached 73.3%. This means that students were able to enhance their understanding of critical reading comprehension, which enabled them to improve their critical and analytical thinking skills, enhance their ability to understand and interpret information, improve their ability to form logical and coherent opinions and arguments, enhance their decision-making skills, and improve their ability to learn and solve problems by applying the Carousel Brainstorming strategy.

Table 7. Improvement of Pre-assessment and Cycle

Siklus Proses	Score percentage
Pre-assesment result	43,3 %
Siklus 1	53,3 %
Siklus 2	73, 3 %
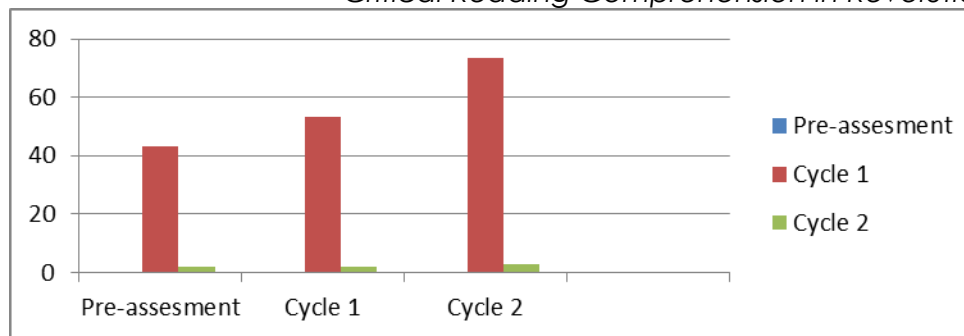
Chart 3. The Result of Cycling percentage

Discussion

To conduct the hypothesis testing, we will use the Independent Samples Test. This test is specifically designed to compare the means of two different and unrelated groups, such as an experimental group and a control group. Its main purpose is to determine if there is a statistically significant difference between the means of the two groups. This is followed by hypothesis testing using the Independent Samples Test.

Table 8. Hypothesis Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
post-test	Equal variances assumed	3.540	.065	6.608	58	.014	16.033	2.912	-21.862	-10.204

452

Equal variances not assumed	5.506	54.727	.014	16.033 2.912	-21.870	-10.197

Independent Sample Test Data is a statistical test used to compare two unrelated sample groups. It is used to determine whether there is a statistically significant difference between the two groups in terms of the mean, median, or mode of the variable being studied (Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C, 2023). As shown in Table 4 above, the statistical hypothesis of this study indicates that the population is normally distributed, with a t-value for equal variance assumed to be 6.608 and a significance (2-tailed) of 0.015. This means that the score is lower than the determined significance level of 0.05. The result is 0.014 < 0.05, which means the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted. As a result, there is an effect of using the Carousel Brainstorming Strategy on improving students' critical reading comprehension.

Table 9. The Effect of the Carousel Brainstorming Strategy on Students' Critical Reading Comprehension

Tests of Between-Subjects Effects

Dependent Variable: Nilai Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	167,764[a]	2	83,882	2,885	,064	,092
Intercept	7597,719	1	7597,719	261,321	,000	,821
Class	64,995	1	64,995	2,235	,140	,038
Pretest	107,764	1	107,764	3,706	,059	,610
Error	1657,236	57	29,074			
Total	317200,000	60				
Corrected Total	1825,000	59				

a. R Squared = ,092 (Adjusted R Squared = ,060)

To compare the experimental class with the control class based on the learning model, the Pretest/initial knowledge scores are used as covariates. Analysis of Covariance (ANCOVA) is often used to analyze trials with a pretest-posttest design, where the intercept and effects (result coefficients) influence the estimated

effects (Qi, H., Rizopoulos, D., and Rosmalen, J. V., 2022). ANCOVA contributes significantly to obtaining detailed information about the extent of the impact of the treatment provided. It uses an ANCOVA model with nominal independent variables and quantitative independent variables. The model includes: dependent variables; nominal independent variables, and quantitative independent variables (Dulgheriu, I., Ionesi, S., D. et al., 2022), and ANCOVA also explains and compares confidence interval estimation methods for standard treatment effect contrasts within the ANCOVA design itself (Shieh, G., 2023). The extent of the effect of the Carousel Brainstorming strategy on Students' Critical Reading Comprehension can be observed in the PARTIAL ETA SQUARED, where the effect is 0.610, which means it is equal to 0.610/100 = 61%. A data interpretation of 56% - 75% is categorized as having a moderate effect, thus a score of 61% can be concluded to have a moderate effect.

This research was a study using the Mix method, meaning based on Quantitative data where the assumption test was carried out first, namely the normality test, homogeneity test, and linearity test after the data produced is normally distributed, it is continued with the homogeneity test and linearity test. The Carousel Brainstorming Strategy data showed 0.11> 0.05, and the value for Students' Critical Reading Comprehension was 0.176> 0.05, all data indicated a normal distribution. The linearity test resulted in 0.306> 0.05 between the independent and dependent variables. The Levene's statistic was 0.301> 0.05, indicating that the data were homogeneous. Then the research was continued using a Queasy experiment using a Nonequivalent Control Group design where the pretest-posttest of the control class and the experimental class were selected by purposive sampling. Then conduct a hypothesis test using the independent sample test analysis so that it produced The hypothesis test showed a two-tailed significance (p) of 0.015, with alpha (a) being 0.014 <0.05, thus HO is rejected and Ha is accepted. The Partial Eta Squared indicates an effect size of 0.610/100 = 61%, categorized as having a modest effect. While qualitative data was obtained from the results of the Pre-Assessment Test Results where the ability of students to master critical reading comprehension shows that 4 students (13%) fall into the "Very Good" category; 4 students (6.6%) fall into the "Good" category; 7 students (23.3%) fall into the "Medium" category; 15 students (50.0%) fall into the "Low" category; and 2 students (6.6%) fall into the "Fail" category. Therefore, the score for those who are able to understand critical reading

comprehension is only 43.3%, while the Low and Fail categories reach 56.6%. So to get truly valid data about increasing use of the Carousel brainstorming strategy, researchers used The Percentage of Cycle Test, the results of Cycle 1, namely the students' ability to understand narrative texts in reading comprehension is as follows: 6 students (20%) fall into the "Very Good" category; 4 students (13.33%) fall into the "Good" category; 6 students (20%) fall into the "Moderate" category; 12 students (30%) fall into the "Low" category; and 2 students (6.6%) fell into the "Fail" category. The results from Cycle 2 were 7 students (23.3%) fell into the "Very Good" category; 14 students (46.6%) fall into the "Good" category; 1 student (3.3%) is in the "Moderate" category; 7 students fell into the "Low" category (23.3%), and 1 student failed (3.3%). Thus, students who were able to improve their Critical Reading comprehension in the second cycle reached 73.3%.

Conclusion and Suggestion

Based on quantitative data using a non-equivalent Control Group Design quasi-experiment and assumption tests, it shows that the Carousel Brainstorming Strategy has a value of 0.11 > 0.05, and the value of Students' Critical Reading Comprehension is 0.176 > 0.05, which means the data is normally distributed. The linearity test shows 0.306 > 0.05, indicating a linear relationship between the independent variable and the dependent variable. Based on Levene's Statistic of 0.301 > 0.05, the data is homogeneous. The hypothesis test shows that the sig. 2-tailed (p) is 0.15 with alpha (a) being 0.05, so 0.014 < 0.05, leading to the rejection of HO and acceptance of Ha. It is concluded that the use of Carousel Brainstorming has an effect on the critical reading comprehension of English Language Education students at Fatmawati Sukarno State Islamic University in Bengkulu. Based on Partial Eta Squared (ANCOVA), it proves that the Carousel Brainstorming Strategy affects the Students' Critical Reading Comprehension in English Language Education at Fatmawati Sukarno State Islamic University in Bengkulu by 0.610, which means it is equivalent to 0.610/100 = 61%. If the percentage data is between 56% - 75%, it is categorized as having a sufficient influence. Based on the average scores in the initial test, the score for those who could understand critical reading comprehension was only 43.3%, and the score in the first cycle reached 53.3%, indicating an increase of only 10%. In the second cycle, it reached 73.3%, meaning there was an increase of 20% from the first cycle to the second cycle. Therefore, this study proves

both quantitatively and qualitatively that using the Carousel Brainstorming Strategy can enhance students' critical reading abilities. Based on the results of this study, it is recommended that:

1. Efforts should be made to maximize the Carousel Brainstorming strategy to enhance critical reading comprehension. This strategy should be more widely integrated into the curriculum of the English Language Education study program. This can be achieved through workshops for lecturers or the development of teaching guides.

2. To improve effectiveness and consistency, specific modules or teaching materials based on Carousel Brainstorming should be developed. These modules will contain step-by-step guidelines, examples of activities, and assessment rubrics to assist both lecturers and students in implementing this strategy.

3. Further research can be conducted to explore the effectiveness of Carousel Brainstorming on other language skills (writing, speaking, listening) or at different educational levels. Additionally, future studies could consider moderator/mediator factors that influence the relationship between this strategy and learning outcomes, for a more comprehensive understanding.

References

Adryan, A, Z. (2023). Study of Color, Atmosphere, and Furniture in Architectural Studio Classroom: Perspective from Mix-Methods Research. *Vitruvian: Jurnal Arsitektur, Bangunan Dan Lingkungan*, *13*(31 Oct 2023). https://doi.org/10.22441/vitruvian

Agresti, Alan, et al. (2023). Categorical Data Analysis. Cambridge University Press.

Baranova N.M. (n.d.). Tools for studying the digital development rates of economic systems at country and region level. *RUDN Journal of Economics*, *31*, 687–699. https://doi.org/10.22363/2313-2329-2023-31-4-687-699

Brookhart, S. M. (2022). Assessing Student Learning: From Tests to Teaching. Routledge.

Bryman, Alan. (2023). Social Research Methods. Oxford University Press.

Cho, B Y., Hwang, H, and Jang B G. (2021). Predicting fourth grade digital reading comprehension: A secondary data analysis of (e)PIRLS 2016. *International Journal of Educational Research*, 105. https://doi.org/10.1016/j.ijer.2020.101696

Cho, H, Y. (2021). Normality Test of the Water Quality Monitoring Data in Harbour. *Journal of Korean Society of Coastal and Ocean Engineers*, *33*(April 30, 2021), 53–64. https://doi.org/10.9765/KSCOE.2021.33.2.53

Carousel l, Robert. (2023). The Carousel Brainstorming Strategy: A New Approach to Generating Creative Ideas. *Journal of Creative Behavior*, 46, 556-566.

Dulgheriu, I., Ionesi, S, D at all. (2022). ANCOVA analysis of penetration force on Kevlar fabrics used for ballistic protective equipment. *Industria Textila*, *73*(05 Mar 2022), 69–76. https://doi.org/10.35530/IT.073.01.202197

Garson, G. David, et al. (2022). Research Methods for Social Sciences. Sage Publications.

Graham, M, K. (2024). Assessing the impact of pre-lecture reading compliance on lecture comprehension in English-medium instruction courses. *Journal of English for Academic Purposes*, *68*(March 2024). https://doi.org/10.1016/j.jeap.2024.101367

Habók, A., Tun Zaw Oo and Magyar, A. (2024). The effect of reading strategy use on online reading comprehension. *Heliyon*, *10*(30 January 2024, e24281). https://doi.org/10.1016/j.heliyon.2024.e24281

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (2023). Multivariate data analysis (8th ed.). Sage.

Hutton, C, M. (2023). From Acoustic Space to the Global Village: Linearity and the Western Intellectual Imagination. DeGruyter. https://doi.org/10.1515/9783110798494-005

Jenkins, A, M. (2023). Hospital Pediatrics, November 09 2023. https://doi.org/10.1542/hpeds.2022-007110

Johnson, R. B., & Onwuegbuzie, A. J. (2024). Mixed methods research: A practical guide. SAGE Publications.

Khoirurrijal. (2023). Stakeholders' perception of vision, mission, objectives, and its implications on curriculum development. An nabighoh, 25(August 2023), 147–162. https://doi.org/10.32332/an-nabighoh.v25i2.7485

Li, X., Xue, J, T and et all. (2023). Think Outside the Code: Brainstorming Boosts Large Language Models in Code Generation. Computer Science Artificial Intelligence, 18 May 2023. https://doi.org/10.48550/arXiv.2305.10679

Lin Wu., Valcke, M, and Keer, V H. (2023). Differential effects of reading strategy intervention for three levels of comprehenders: Focus on text comprehension and autonomous reading motivation. Learning and Individual Differences, 104(May 2023). https://doi.org/10.1016/j.lindif.2023.102290

Lin, Y., Yu, Z. (2023). Extending Technology Acceptance Model to higher-education students' use of digital academic reading tools on computers. *International Journal of Educational Technology in Higher Education*, *20*(16 June 2023). https://doi.org/10.1186/s41239-023-00403-8

Marks, D, F. (2023). The Action Cycle Theory of Perception and Mental Imagery. Vision, 7(14 February 2023), 9–12. https://doi.org/10.3390/vision7010012

McWhorter, M. (2023). *Critical Reading: A Guide for Students*. Routledge.

Moghadam, Z.B., Narafshan, M.H. & Tajadini, M. (2023). The effect of implementing a critical thinking intervention program on English language learners' critical thinking, reading comprehension, and classroom climate. Asian. J. Second. Foreign. Lang. Educ., 8(15 (2023).). https://doi.org/10.1186/s40862-023-00188-3

Yusrizal, Susanto, Kurniawan   *The Impact of Implementing the Carousel Brainstorming Strategy to Improve Students' Critical Reading Comprehension in Revolution 5.0*

Nyimbili, F and , L. (2024). Types of Purposive Sampling Techniques with Their Examples and Application in Qualitative Research Studies. *British Journal of Multidisciplinary and Advanced Studies*, *5*(16-02–2024). https://doi.org/10.37745/bjmas.2022.0419

Perrenoud, G., Geese and et all. (2023). Mixed methods instrument validation: Evaluation procedures for practitioners developed from the validation of the Swiss Instrument for Evaluating Interprofessional Collaboration. BMC Health Services Research, 25 January 2023, 2–22. https://doi.org/10.1186/s12913-023-09040-3

Psyridou, M., Ruotsalainen,J and et all. (2024). Family factors and critical reading skills: A systematic review. PsyArXiv, June 20, 2024, 2–89. https://doi.org/10.31234/osf.io/m8z7y

Qi, H., Rizopoulos, D and Rosmalen,J, V. (2022). Incorporating historical control information in ANCOVA models using the meta-analytic-predictive approach. Research Syntesis Methods, 13(6)(7 April 2022), 681-696. https://doi.org/10.1002/jrsm.1561

Qin, Z., Wang, C and et all. (2024). Brainstorming Brings Power to Large Language Models of Knowledge Reasoning. Computer Science Computation and Language, 02 Jun 2024. https://doi.org/10.48550/arXiv.2406.06561

Roa, R, C. (2024). Critical Reading inside a Cross-curricular Approach. *HOW, 31*(Mar 4, 2024), 107–122. https://doi.org/10.19183/how.31.1.652

Sharma , L., R. (2022). Dealing with Crucial Aspects of Action Research. *International Research Journal of MMC*, *3*(2022-12–28).